OPIS A DOW JONES COMPANY

CHEMICAL MARKET ANALYTICS

Growth Opportunities in the Chemical Sector

Canadian Petrochemical Summit, June 17-19, 2025

Steve Lewandowski

Vice President, Olefins and Derivatives

Terms of Use

OPIS A DOW JONES COMPANY
CHEMICAL MARKET ANALYTICS

The accompanying materials were prepared by Chemical Market Analytics by OPIS, a Dow Jones Company (Chemical Market Analytics by OPIS) and are not to be redistributed or reused in any manner without prior written consent, except for client internal distribution as described below.

Chemical Market Analytics by OPIS strives to be supportive of client internal distribution of Chemical Market Analytics by OPIS content but requires that:

- Chemical Market Analytics by OPIS content and information, including but not limited to graphs, charts, tables, figures, and data, are not to be disseminated outside of a client organization to any third party, including a client's customers, financial institutions, consultants, or the public.

- Content distributed within the client organization must display Chemical Market Analytics by OPIS legal notices and attributions of authorship.

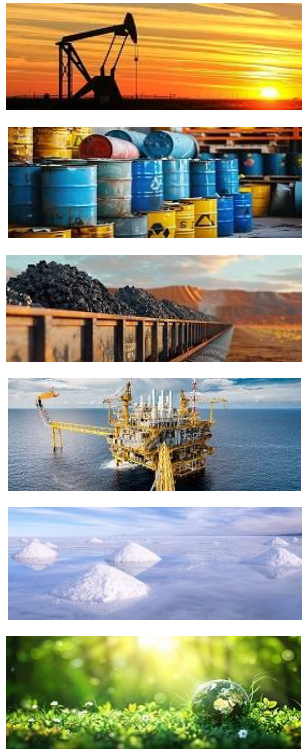
Some information supplied by Chemical Market Analytics by OPIS may be obtained from sources that Chemical Market Analytics by OPIS believes to be reliable but are in no way warranted by Chemical Market Analytics by OPIS as to accuracy or completeness. Absent a specific agreement to the contrary, Chemical Market Analytics by OPIS has no obligation to update any content or information provided to a client.

The Chemicals Values Chain – Assessing Needs / the Bridge

OPIS A DOW JONES COMPANY
CHEMICAL MARKET ANALYTICS

From Natural Resources to the Consumer, Improving People's Lives

Natural Resources → Refining & Processing → Base Chemicals → Chemical Intermediates → Converted Products → End Consumer



Fuels

Olefins
- Ethylene
- Propylene
- Butadiene
- Butylenes

Aromatics
- Pygas
- Benzene
- Toluene
- Xylenes

Chlor-Alkali
- Chlorine
- Caustic Soda

Others
- Ammonia
- Phosphorous
- Methanol

Polyethylene
Polypropylene
PET
PVC
Rubber
Polyester
Nylon
ABS
Polyurethane
Polycarbonate
Polystyrene
Soda Ash

Plastics & engineering resins
- Extruded films, pipes, profiles, coatings, sheets, foams
- Blow-molded parts
- Injection molded parts
- Composites

Synthetic fibers
Rubber products
Paints & coatings
Adhesives & sealants
Lubricants
Water treatment products
Cleaning products
Industrial chemicals
Flame retardants
Many others…

From Cheap Feedstocks → **To Versatile Molecules** → **To Quality Of Life**

OPIS
A DOW JONES COMPANY

CHEMICAL MARKET ANALYTICS

Key Drivers Impacting Growth in Chemical Demand

Population Growth / Growth in Consumer Demand / Technology Changes

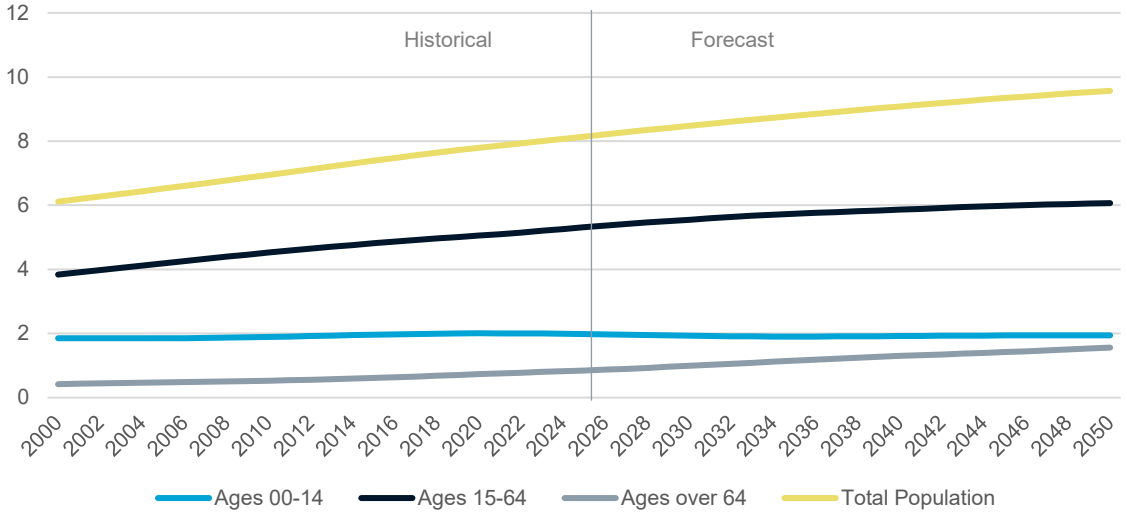
Growth in Consumer Demand

Growing population and household disposable income leads to higher chemical consumption

OPIS A DOW JONES COMPANY
CHEMICAL MARKET ANALYTICS

World Population

billion

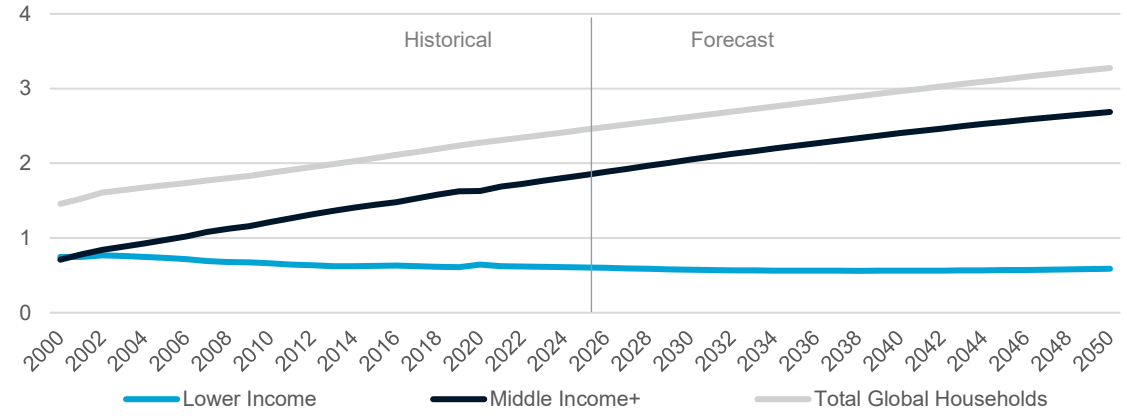


Source: Oxford Economics

- Global population on a steady growth trajectory with more than 1.5 billion new inhabitants over the next 25 years
- Over 50% of the world's households were categorized as lower income in 2000. By 2050, this is expected to be less than 20%.
- Household income growth is continuing to drive up consumption per capita as significant fraction of the world's population has been lifted out of poverty.
- ***These trends are driving to higher consumption of materials based on petrochemicals.***

Global Household Disposal Income

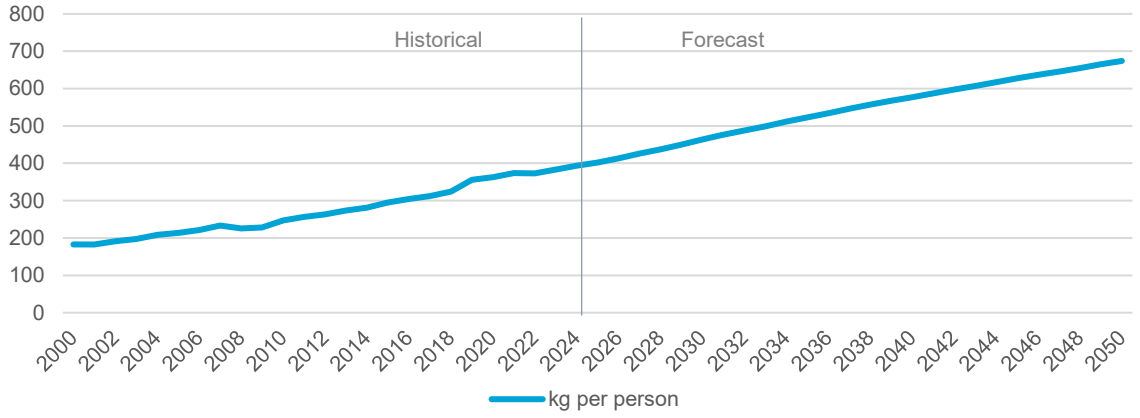
000US$



Source: Oxford Economics

Base Chemical* Consumption per Capita

kg/person

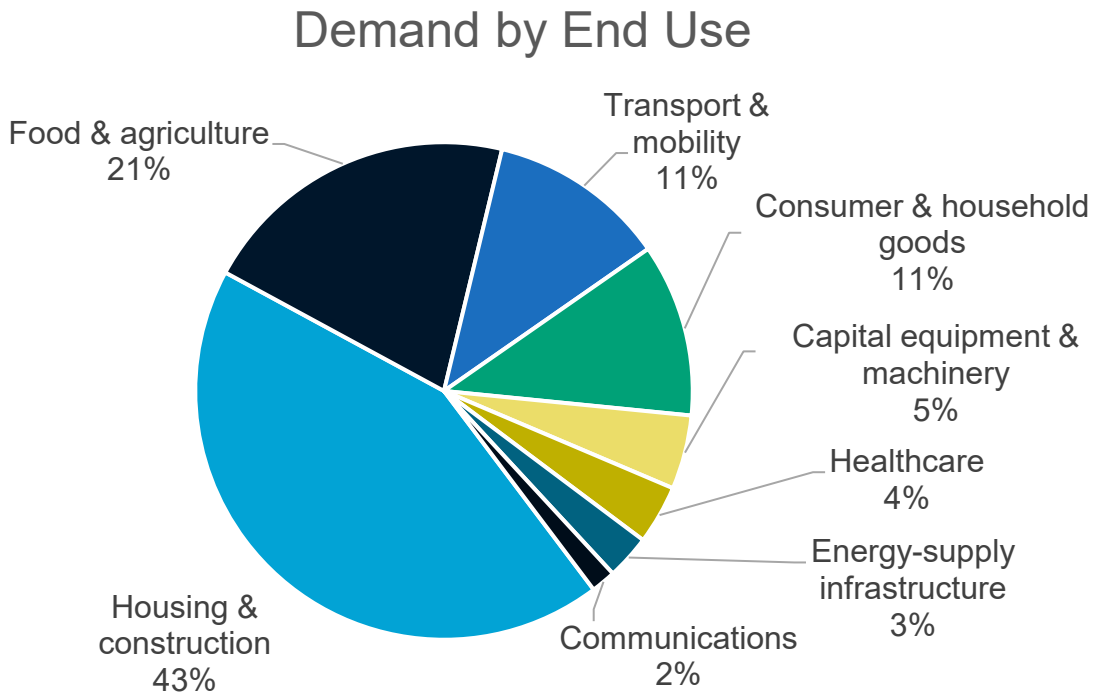


Source: Chemical Market Analytics by OPIS

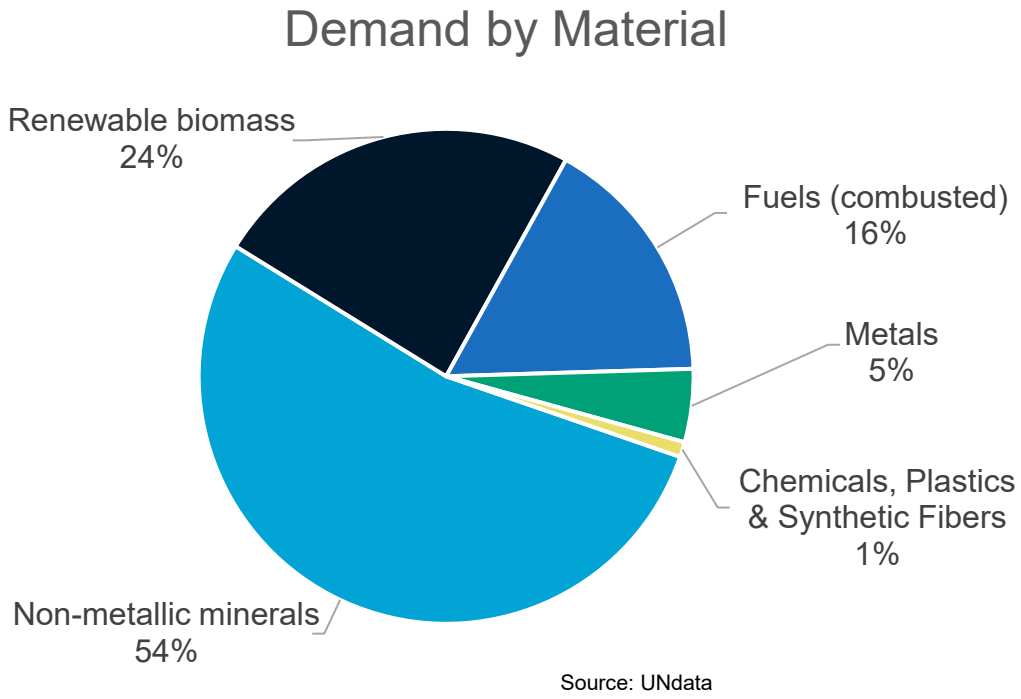
*Note: Base Chemicals include Ethylene, Propylene, Methanol, Ammonia, Chlorine, Benzene and Paraxylene

Chemicals, plastics & synthetic fibers represent a small fraction of 100+ gigaton global material demand. *This is an enormous opportunity for petchem growth.*

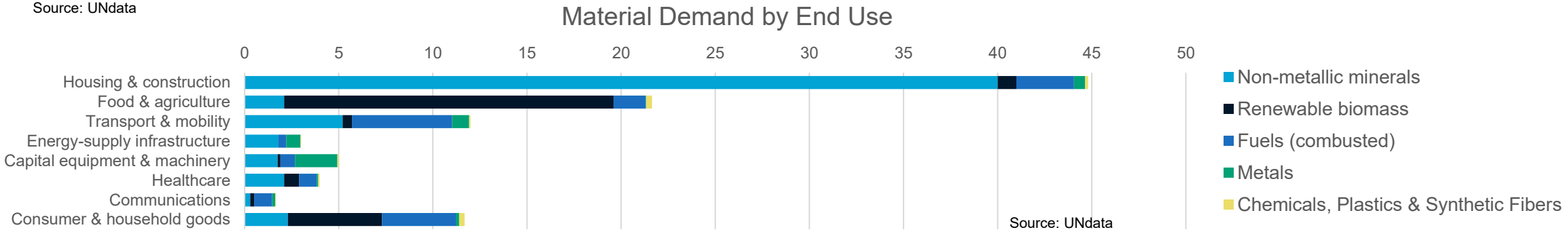
OPIS A DOW JONES COMPANY
CHEMICAL MARKET ANALYTICS



Source: UNdata



Source: UNdata



Source: UNdata

6

OPIS
A DOW JONES COMPANY

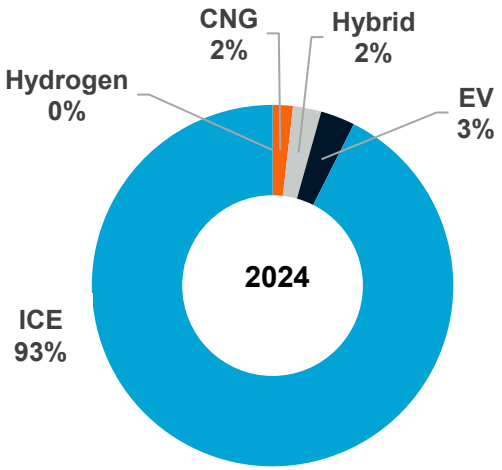
Energy Transition

Global view of liquids demand: set, in part, by global fleet energy source

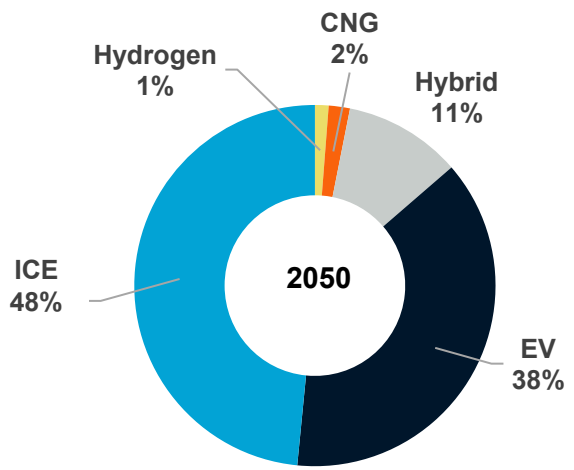
OPIS A DOW JONES COMPANY
CHEMICAL MARKET ANALYTICS

- EVs accommodate the growth in mobility, largely in the urban centers in the developed world.
- Rising trade barriers, waning enthusiasm for EVs plus the rise of energy-intense AI applications complicate a rapid transition.
- Internal combustion engines (ICE, including hybrids) ***"only"*** decline by 100 million units throughout the forecast period as the overall fleet size grows

Vehicle Fleet Evolution



Total Fleet: 1.505 billion

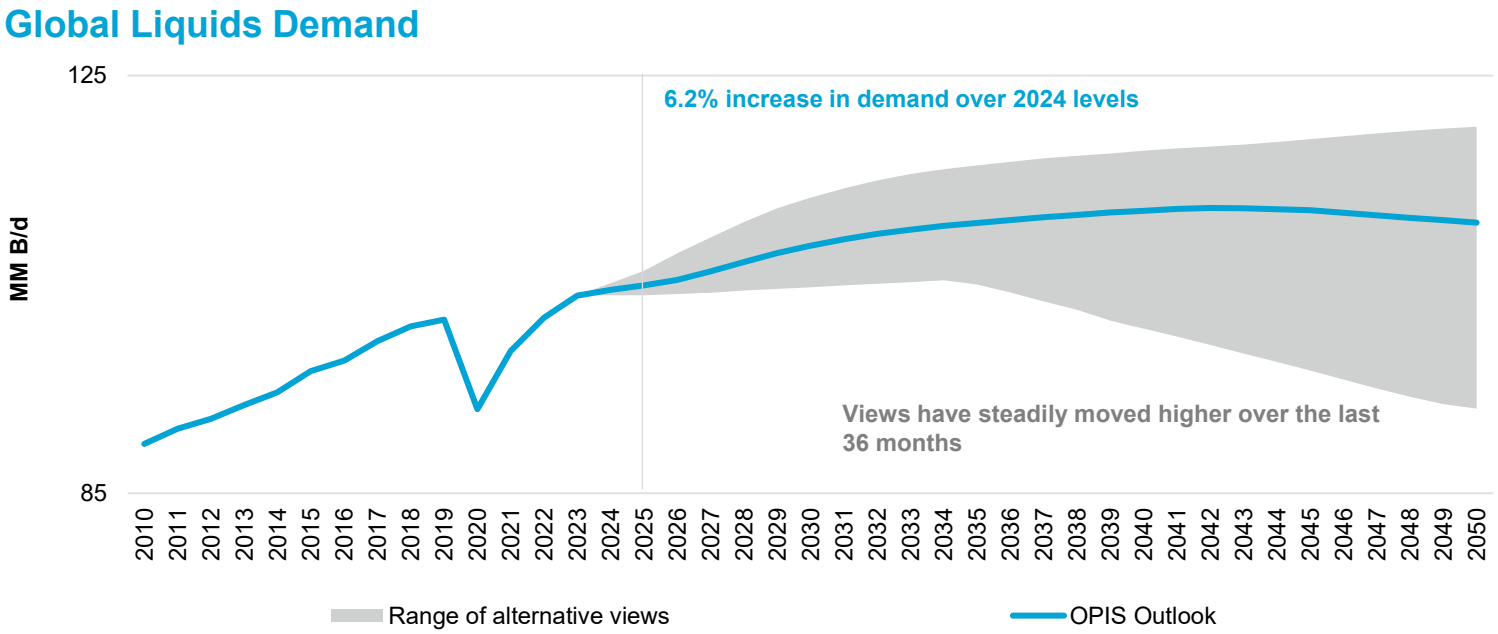


Total Fleet: 2.260 billion

Global view of liquids demand: evolution rather than transition

OPIS A DOW JONES COMPANY
CHEMICAL MARKET ANALYTICS

- OPIS forecast shows a gradual increase of demand with a plateau occurring in the early 2040's, then small declines thereafter as energy efficiency measures outpace growth.
- OPIS forecasts oil demand as firmly entrenched not only in transport fuels, but also in non-fuel applications.
- Growth in population and economic activity, especially in developing countries, necessitate increased consumption.

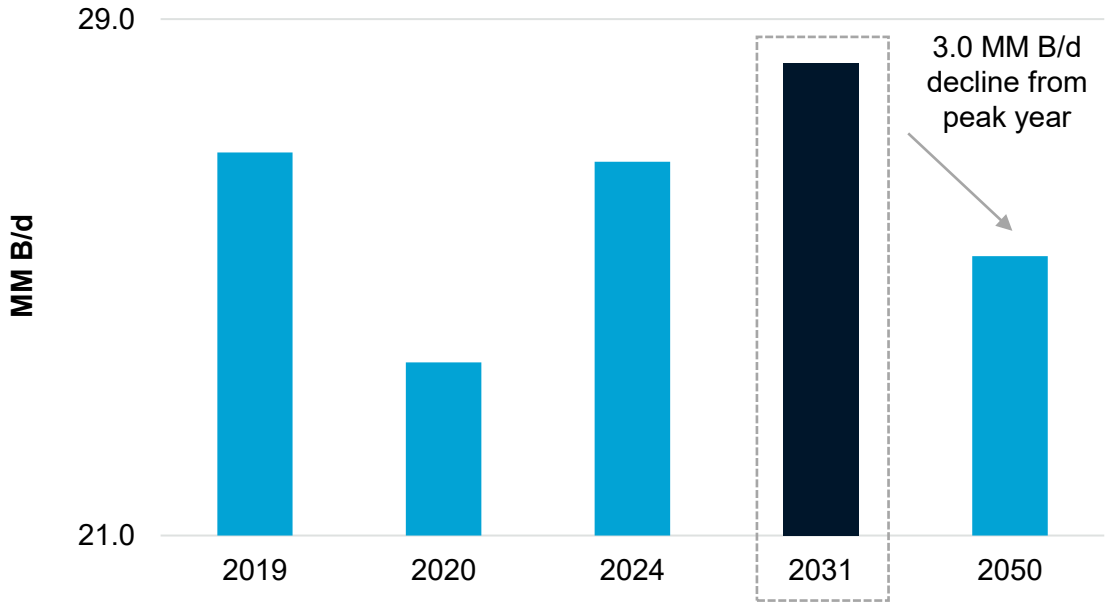


Source: OPIS

Expected evolution of the vehicle fleet will translate into lower gasoline demand

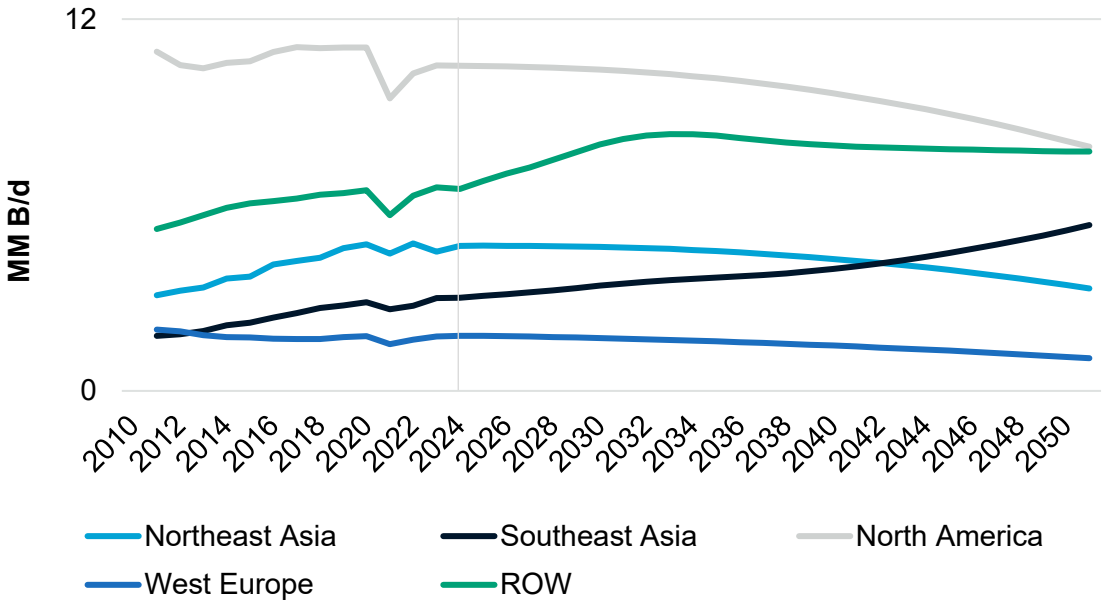
OPIS A DOW JONES COMPANY
CHEMICAL MARKET ANALYTICS

Global gasoline demand



Source: OPIS

Gasoline demand by region



Source: OPIS

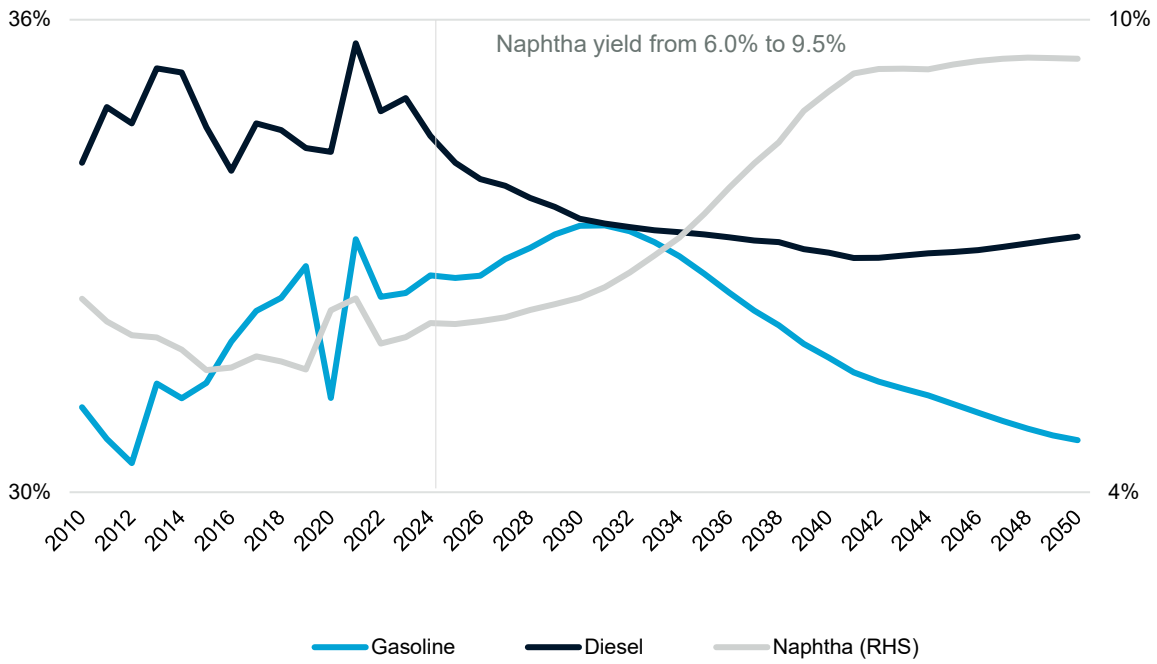
- The rapid adoption of EV in Europe and China is setting the stage for a structural shift in gasoline consumption. However, such penetration of EVs will be challenging for growing, emerging markets such as Africa, South Asia and Latin America.
- The combined effect of an evolving fleet composition and continued growth elsewhere is expected to have a net decline of 5.5% in global gasoline consumption between 2024 and 2050 with a mid-term peak in 2031 of 5.6% above 2024 levels.
- Upside risks to this forecast include infrastructure gaps, affordability, and policy inertia which could delay widespread adoption, preserving gasoline's role in the fuel mix for longer.

Feedstocks will be the main driver of oil demand growth

Refiners will have to pull all levers to boost naphtha yield, reducing other light product yields

OPIS A DOW JONES COMPANY
CHEMICAL MARKET ANALYTICS

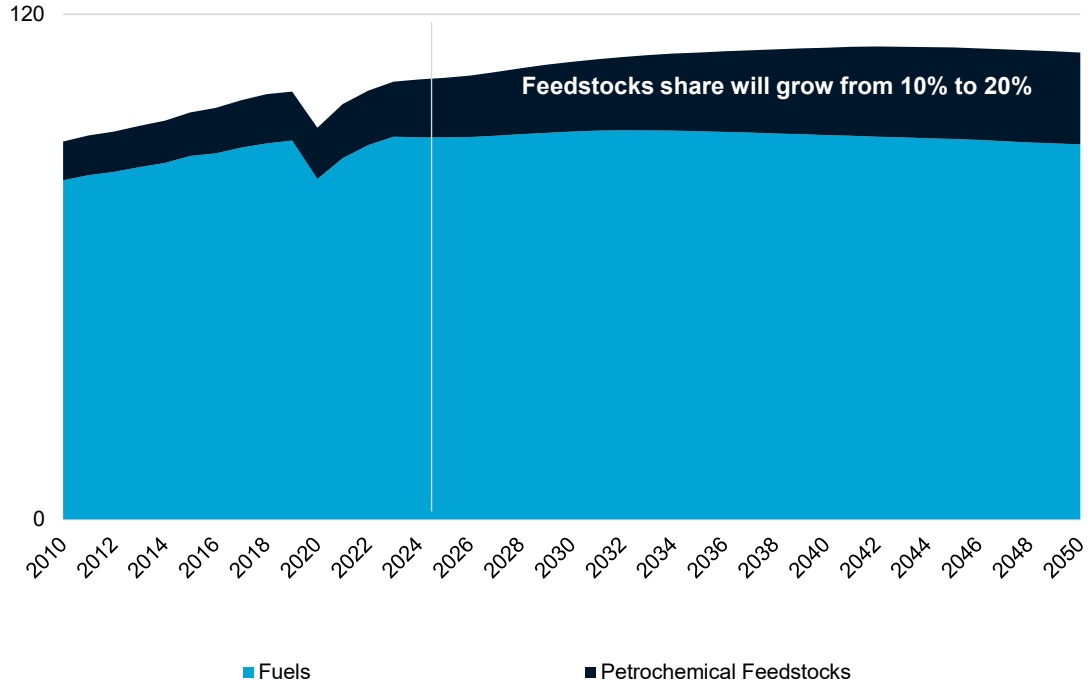
Refinery Yield Evolution
2010 – 2050



Note: Yields expressed as percentage of refinery runs

Source: OPIS

Global Liquids Demand: Fuels vs Feedstocks
2010 – 2050 mmb/d



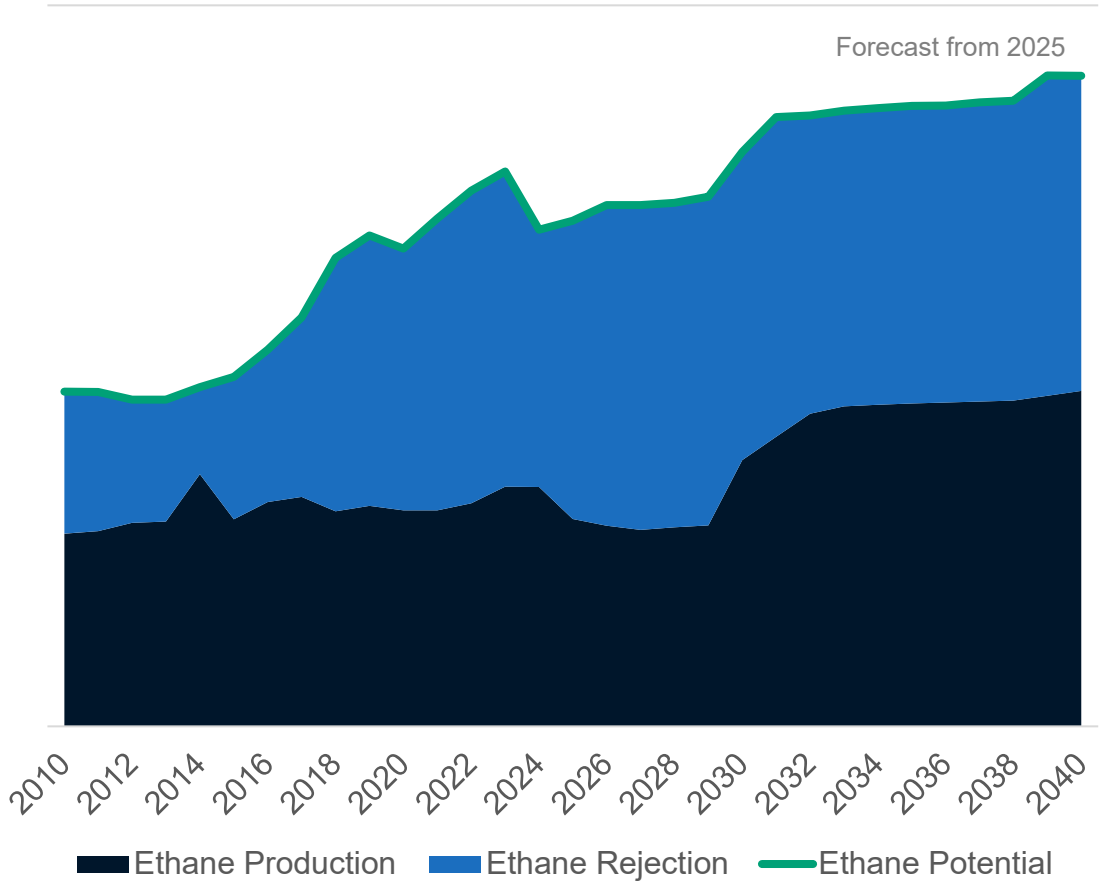
Source: OPIS

- Robust demand for plastics and synthetic materials will continue well into the future, to the point where the existing refining complex (which has largely been built to deliver fuel products) is unable to meet the demands by the late 2030's.
- Gasoline and diesel yields will be lower in line with weaker growth forecast, but also as a result of refineries running on max naphtha yields

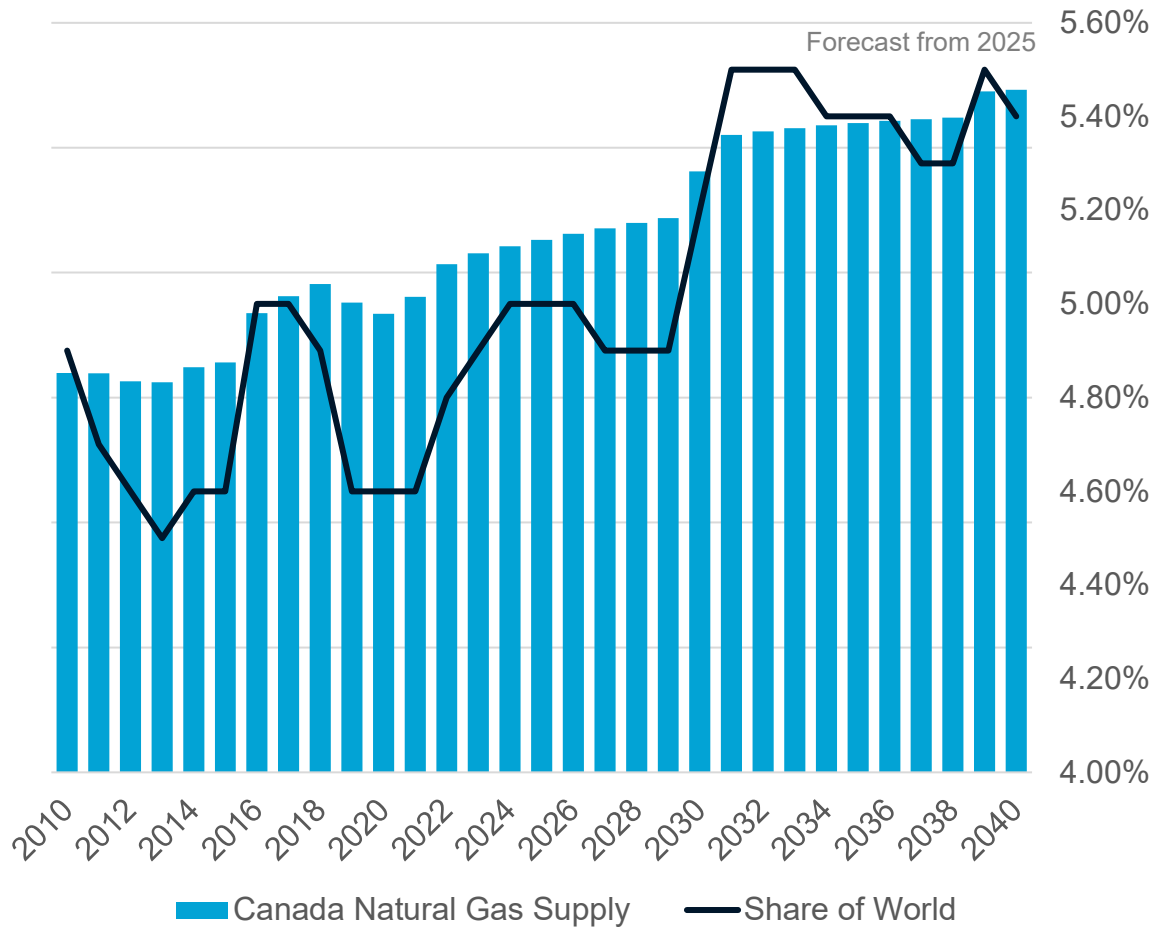
Canadian supply of natural gas continues to grow (limited by offtake), with ethane potential to support petrochemical production

OPIS A DOW JONES COMPANY
CHEMICAL MARKET ANALYTICS

Canada Supply of Ethane
2010 – 2040 thousand barrels/day



Canada Supply of Natural gas
2010 – 2040 billion cubic meters dry gas



Source: OPIS

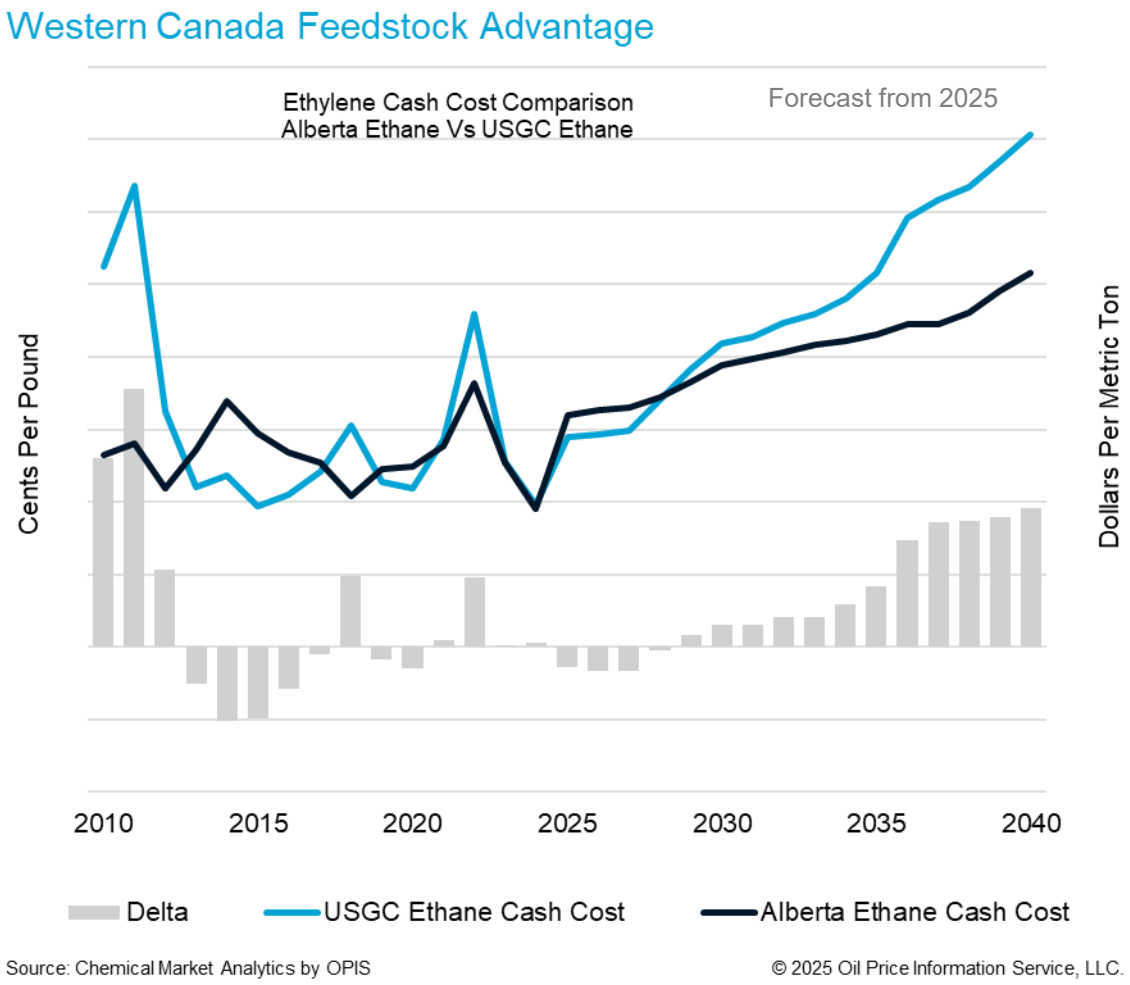
12

Alberta advantage returns as USGC ethane price increases

OPIS A DOW JONES COMPANY
CHEMICAL MARKET ANALYTICS

Alberta Advantage – long lasting

- Alberta remains Canada's largest producer of liquid-rich natural gas, providing an abundance of cost-effective feedstock for petrochemical production
- Alberta lacks extensive ethane export infrastructure, causing excess ethane to be "rejected" into the gas stream and sold at lower energy values
- Alberta's four ethane-based steam crackers consume a portion of the ethane, but even with Dow's new Path2Zero cracker, excess ethane will remain available for conversion to chemicals



13

OPIS
A DOW JONES COMPANY

CHEMICAL MARKET ANALYTICS

Opportunities & Challenges in the Circular Plastics Economy

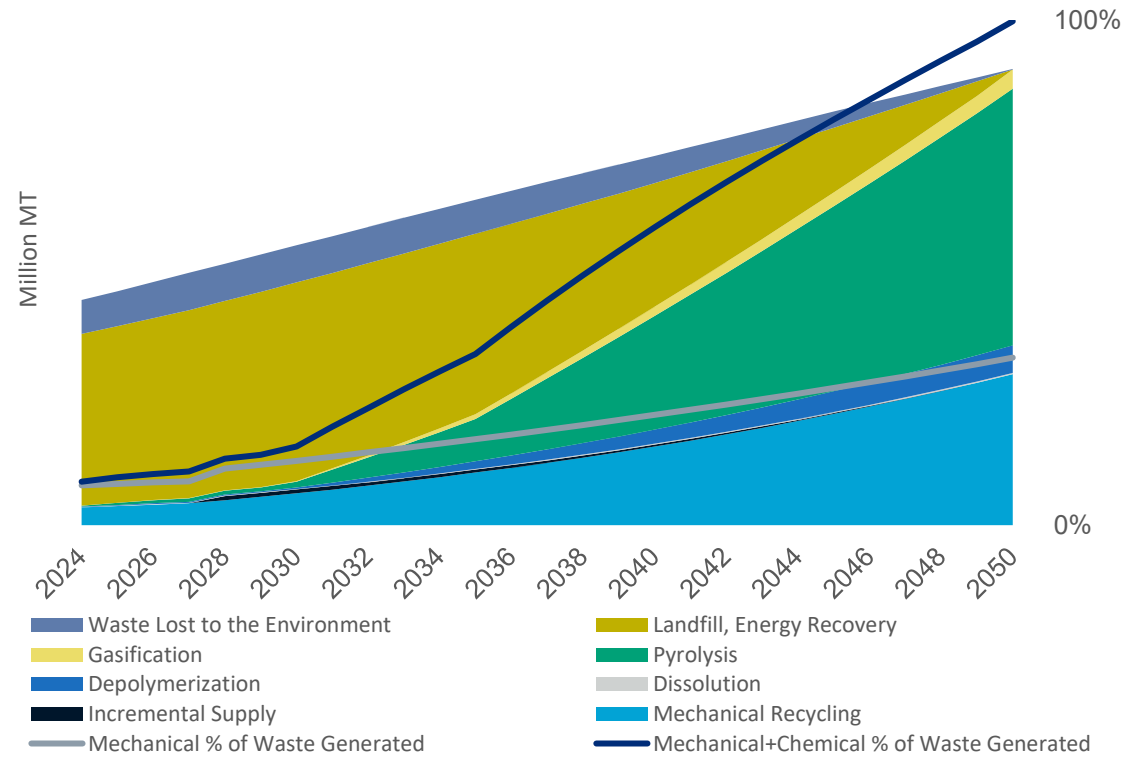
Even in an aggressive, fully circular scenario, eliminating plastics waste does not equate to eliminating fossil-based production

OPIS A DOW JONES COMPANY
CHEMICAL MARKET ANALYTICS

- Contribution of plastics waste volumes into chemical recycling (pyrolysis) do not equate to output (r-Naphtha)
- Despite an accelerated and coordinated global effort to address plastics waste, fossil-based feedstocks will be used many years after the peak

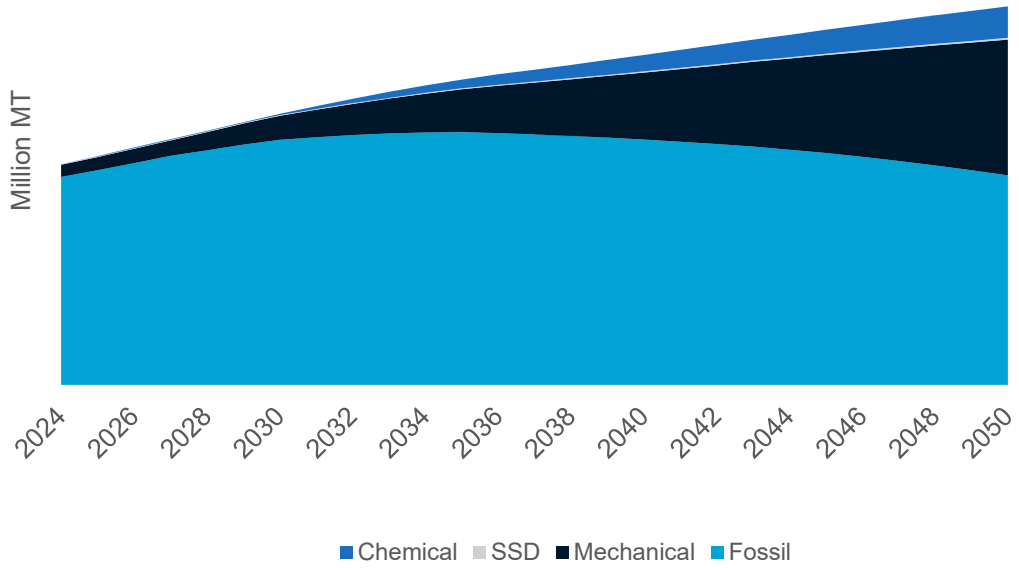
Circular Plastics 2050

Global Disposition of Total Plastics



Source: Chemical Market Analytics by OPIS

Feed Composition of Polyolefins



Source: Chemical Market Analytics by OPIS

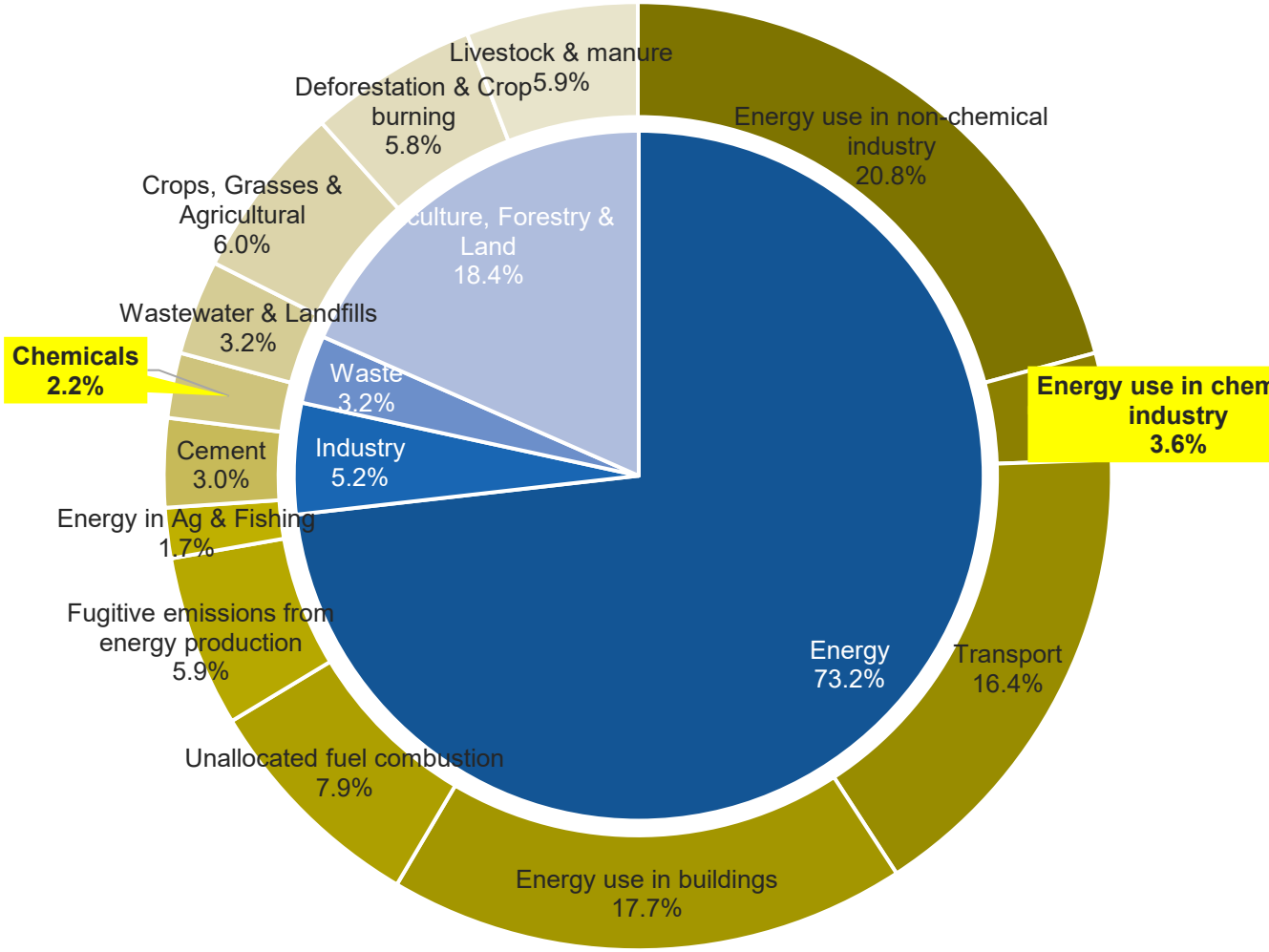
Global greenhouse gas emissions by sector

Chemicals represent <6% of global GHG emissions including energy consumption & process emissions

OPIS A DOW JONES COMPANY
CHEMICAL MARKET ANALYTICS

Chemicals represent a relatively small portion of global greenhouse (GHG) emissions but are a prominent target for abatement.

- **High leverage on other sectors.** The chemical industry underpins many other industries, so decarbonizing the base chemical raw materials lowers the embedded carbon footprint of downstream products, including green products such as solar panels, batteries for electric vehicles (EV), and reusable bags, bottles and containers
- **Point-source abatement.** Chemical industry emissions come from thousands of identifiable plants, compared to agriculture, for example, where emissions are dispersed across millions of farms.
- **Feedstock and process emissions.** Regulators view chemical processes as “low hanging fruit” for abatement, as technologies exist (although they are typically costly)
- **Rapid demand growth.** Use of chemicals and plastics continues to increase as population grows and middle class expands globally, so emissions will increase without abatement.
- **Regulatory momentum.** Initiatives which generally started in the EU, for sector compliance, are spreading globally.

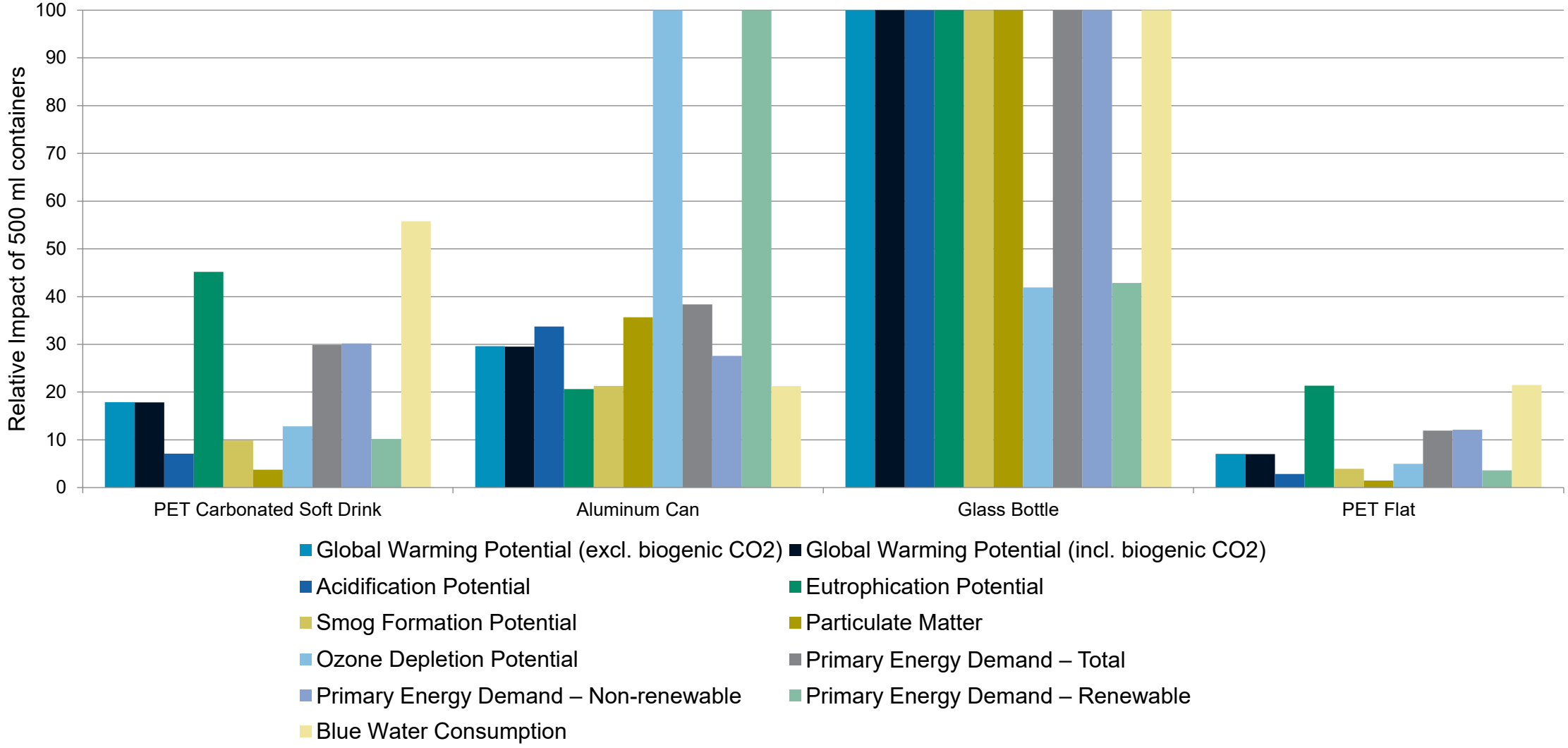


Source: ourworlddata.org

17

Life Cycle Assessment shows PET bottles have lower overall environmental impact than aluminum cans or glass bottles

OPIS A DOW JONES COMPANY
CHEMICAL MARKET ANALYTICS



Source: Husky Injection Molding / Sphera, 2023 Comparative LCA on 500 ml Beverage Packaging Products

Decarbonization policy landscape for the chemical industry

Shift in USA with new administration; world still moving toward reducing emissions

OPIS A DOW JONES COMPANY
CHEMICAL MARKET ANALYTICS

	Canada	USA	China	India	Middle East	Europe
Regulation	Consumer carbon tax removed; industry tax w/ tightening benchmarks for petrochemicals	Withdrew from Paris Agreement, IRA rollbacks pending, EPA CO2 limits for power revoked	Phased expansion of ETS; petrochemicals to be added c 2027-28	Carbon Credit Trading Scheme (CCTS) under development	15/18 countries ratified Paris Agreement. NOC's have pledges for Net Zero	ETS widens; CBAM poised to add chemicals c.2027
Incentives	Refundable CCUS & clean H2 investment tax credit	Fed credits in doubt; state-level incentives intact	Sovereign green bond issued April 2025; electrification of crackers in scope	Production Linked Incentives (PLIs) implemented to support goal of net-zero by 2070	ADNOC budgeting $23B for decarbonization	€4.2B Innovation Fund; 1st e-cracker pilot; Germany H2Global; CCfD being discussed
Carbon Pricing	Carbon tax of C$80/ton & rising	No federal carbon price; some states have cap-and-trade	Carbon Emissions Allowance averaged 98 yuan in 2024; 40% of emissions covered	Pilot carbon-credit exchange; trades ₹800-900/ton not yet mandatory	No mandatory carbon price; voluntary credits trade on ACX, Riyadh	EU allowance €72/ton May 2025; chemical plant free allocation phasing out from 2026
Industry Signal	Dow's flagship Path2Zero cracker complex paused	FIDs paused; low-CO2 resin interest remains	China remains largest coal-based chemicals mfr; CO2 emissions declining as renewable power increases	Green hydrogen/ammonia power transmission infrastructure advancing under SIGHT	Multiple projects under development: Saudi NEOM, Jubail CCS hub,	Rationalization of assets due to high cost position in competitive market

Increased focus on decarbonization — Reduced focus on decarbonization

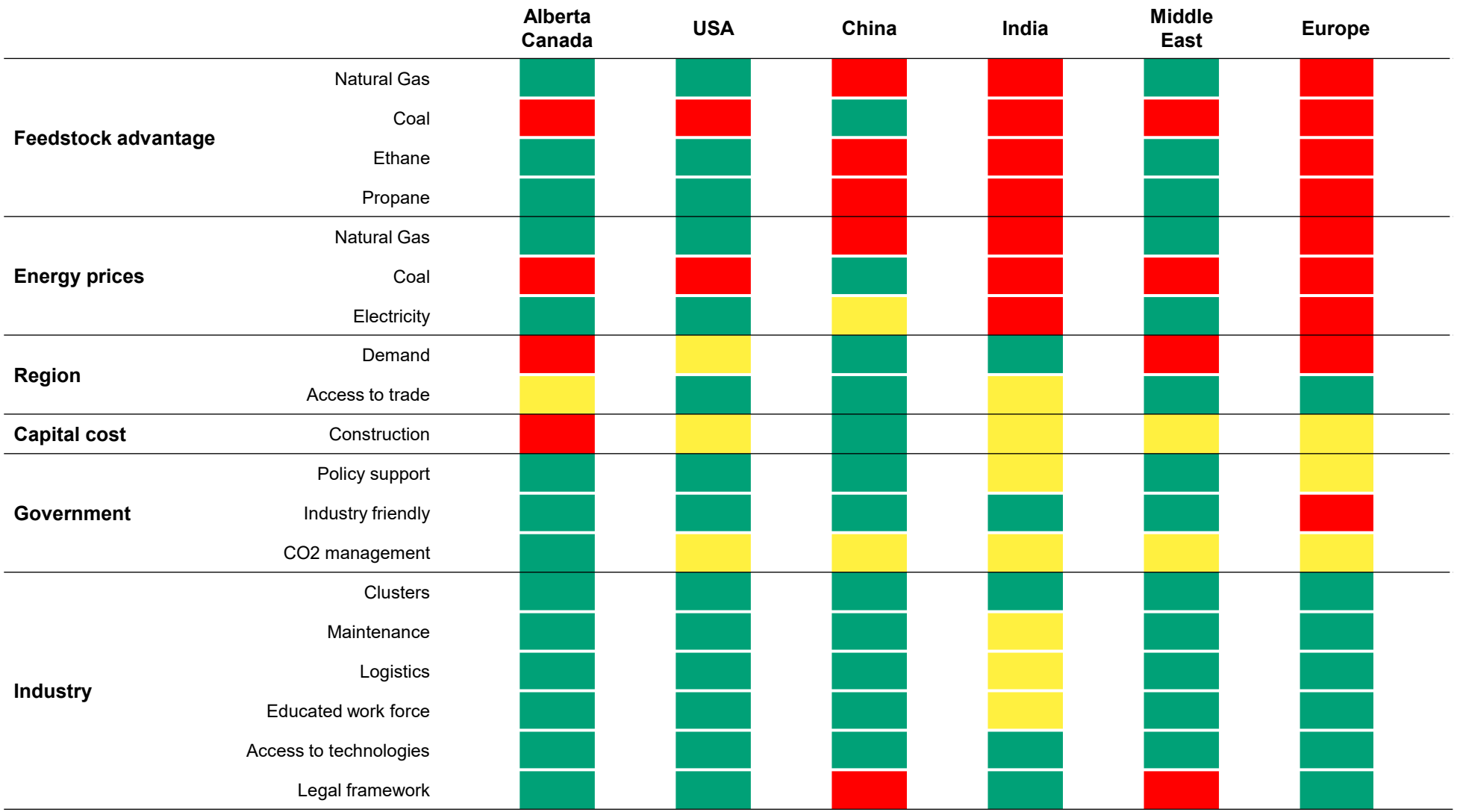
OPIS
A DOW JONES COMPANY

CHEMICAL MARKET ANALYTICS

Most Attractive Petrochemicals for Investment in Alberta

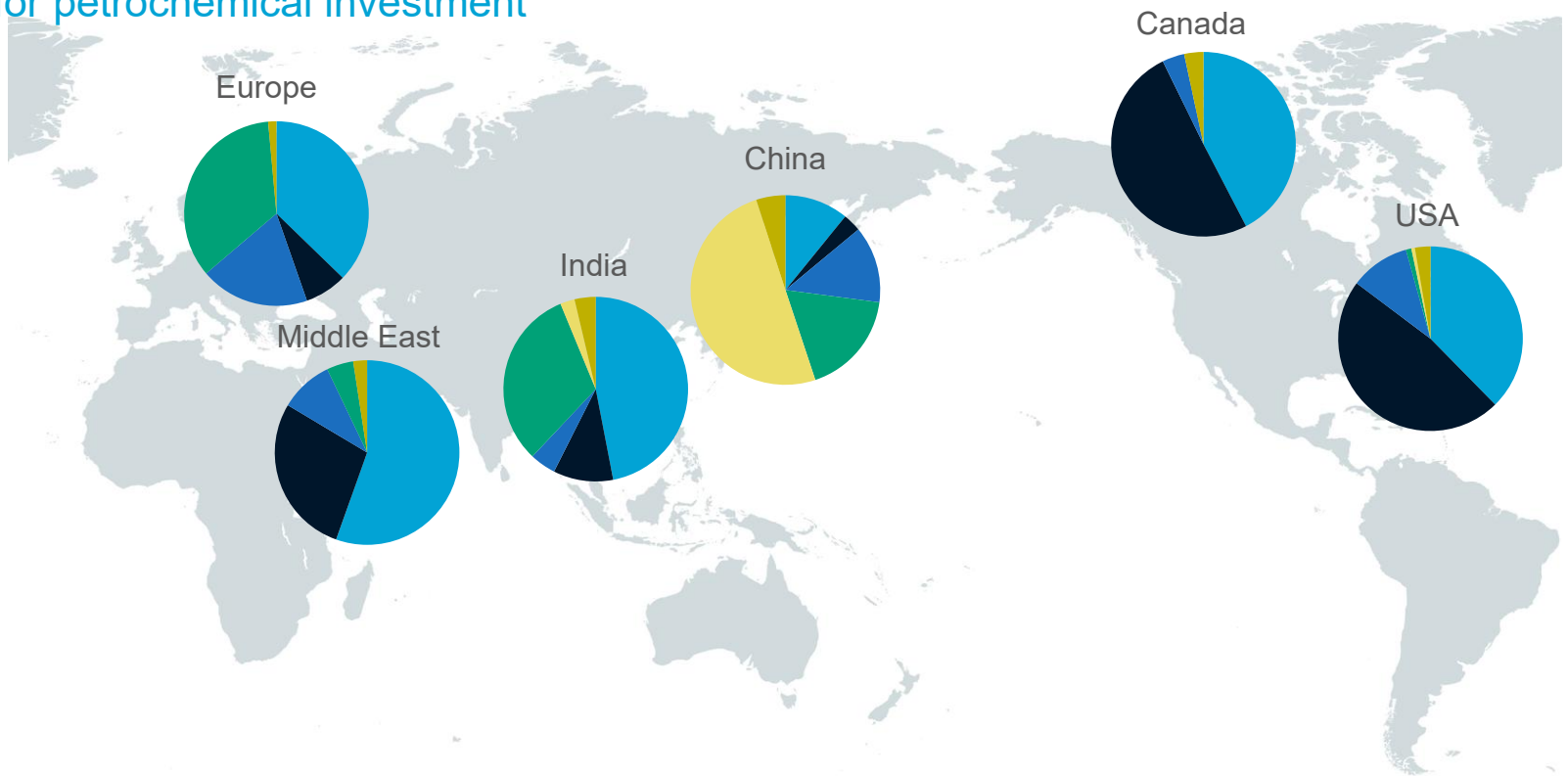
Stacking up with the competition

Alberta is industry friendly with energy and feedstock advantages



Alberta is well-positioned with feedstock advantage and access to Asia from West Coast

Six key metrics for petrochemical investment



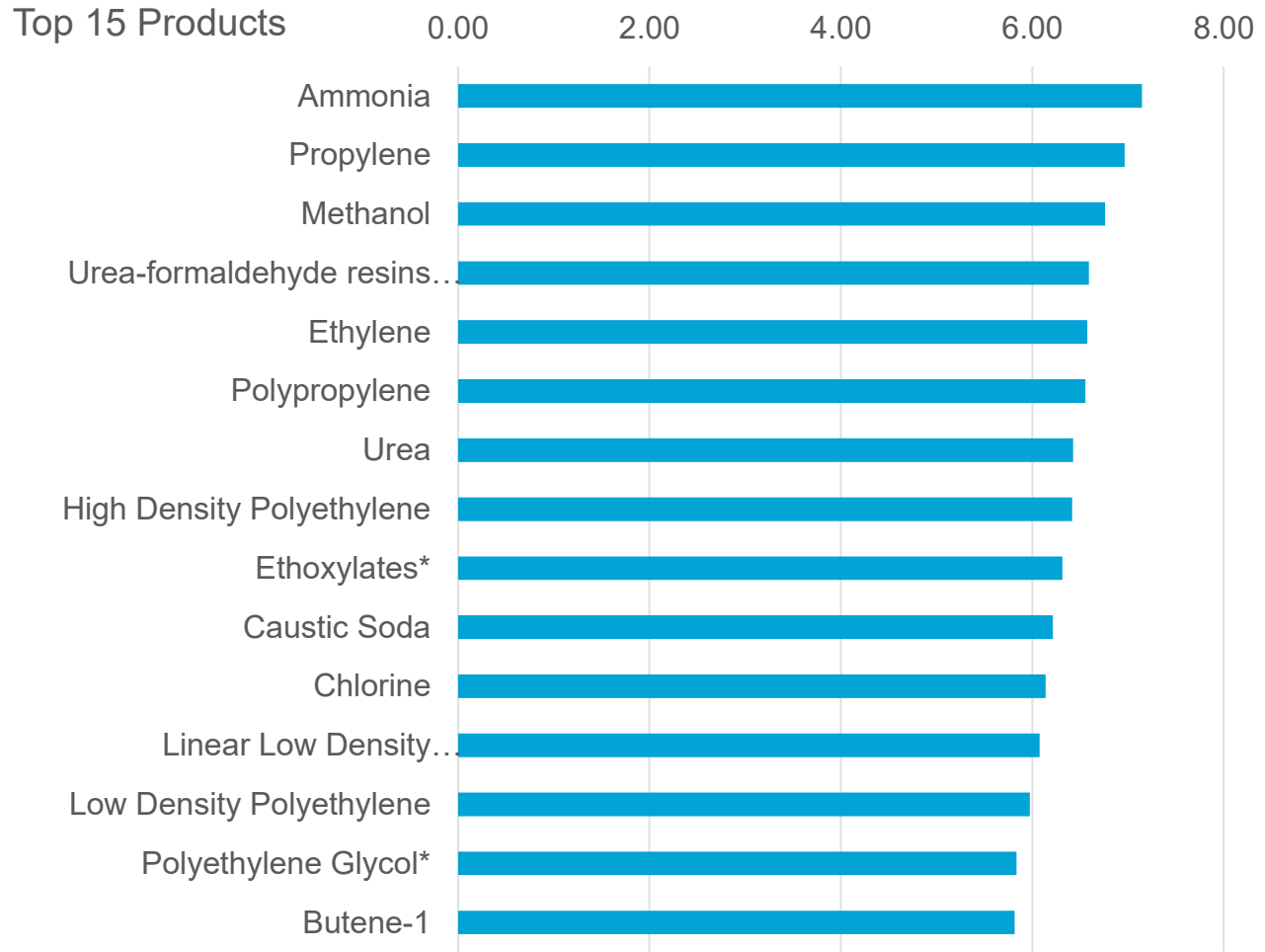
	United States	Europe	Middle East	Asia	*Western Canada*
Secure Energy Position	Advantaged	Disadvantaged	Advantaged	Importer / China coal as feed	*Advantaged*
Integration	Feed to intermediates	Challenged	Feed to intermediates	Intermediates to end use	*Feed to intermediates*
Demand	Build to export	Moderate	Build to export	High	*Build to export*
Investment Drivers	Feedstock advantage	Sustainable / Specialization	Feedstock advantage	Proximity to demand and low-cost labor	*Feedstock advantage*
Sustainable Policies	Accelerating (IRA)	Lead	Energy / Derivative planning	Mixed	*Lead, CO_2 pipe hub*
Trade Challenges	Sanctions	CBAM / EPR/ Net Zero	Exporter	China Import Restrictions	*Over the mountains or into the US*

CMA/OPIS identified best options for petrochemical investment in Alberta

Over 100 chemicals were screened and ranked

OPIS A DOW JONES COMPANY
CHEMICAL MARKET ANALYTICS

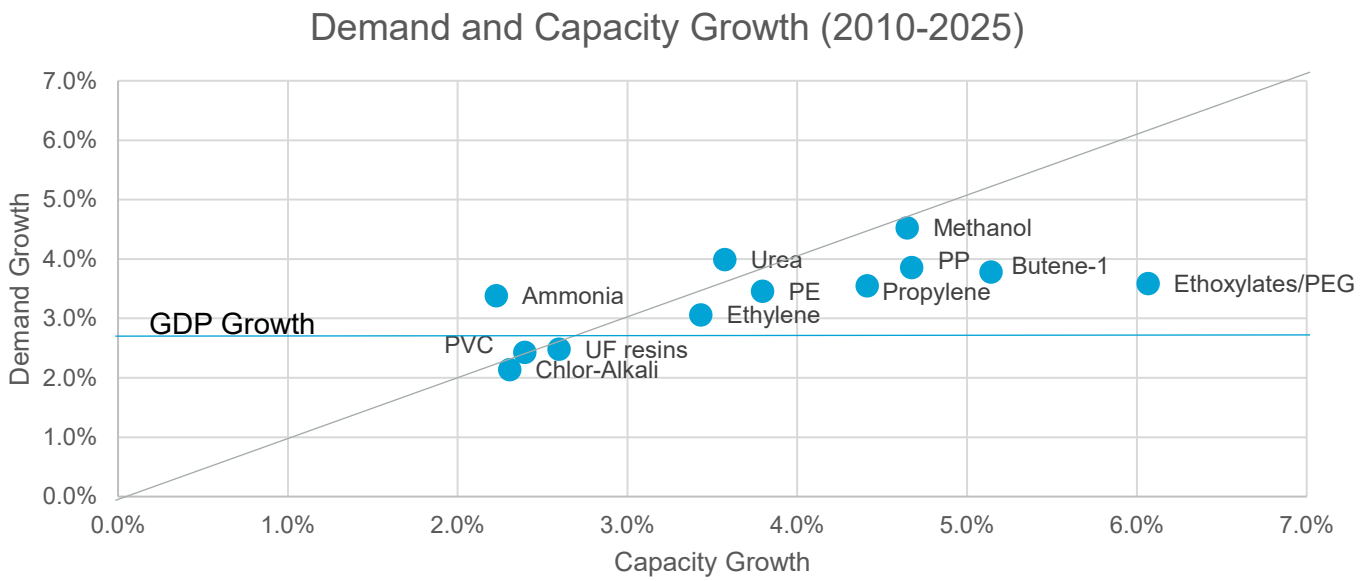
- Chemical Market Analytics by OPIS was recently engaged to update Alberta's Industry Heartland Association on best potential options for petrochemical investment in the region
- Factors including in the evaluation:
  - Market attractiveness
  - Technology attractiveness
  - Economics
  - Environmental/Infrastructure
- The focus was on evolution of the market from 2030-2040
- The top 15 products were selected for further evaluation and identification of opportunities and potential investors

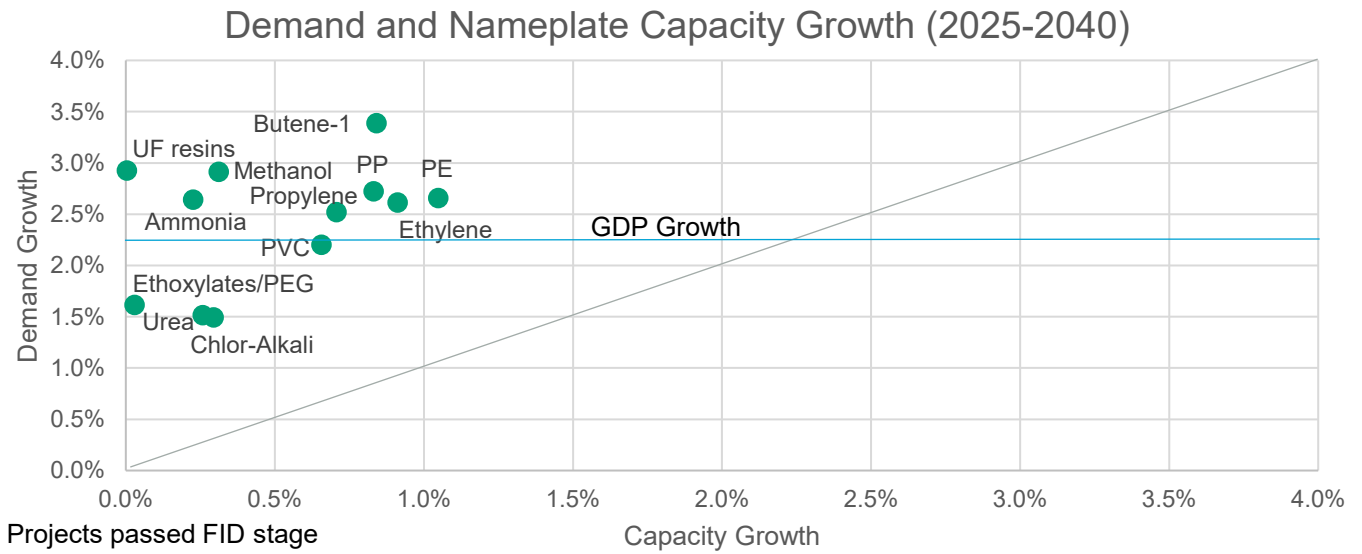


23

Additional capacity will be needed to supply future chemical demand growth, once industry recovers from over build

OPIS A DOW JONES COMPANY
CHEMICAL MARKET ANALYTICS





Projects passed FID stage

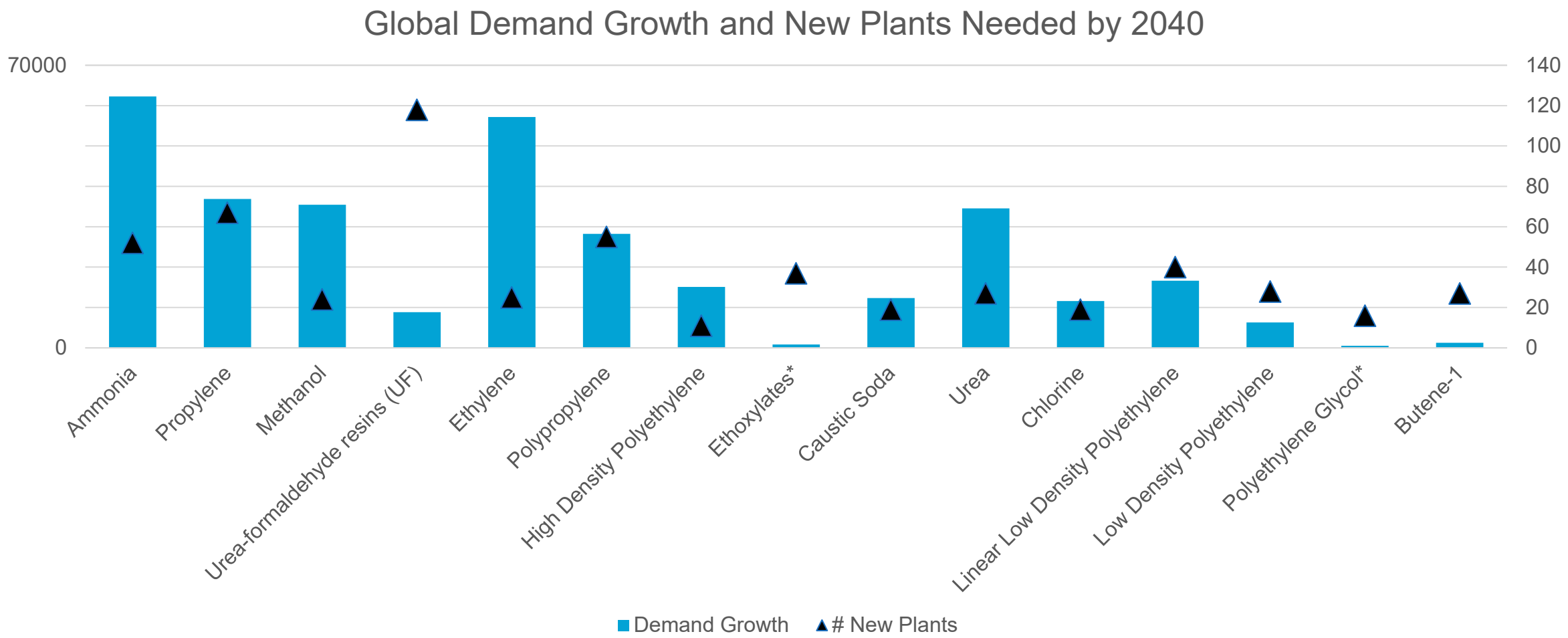
- Capacity in the chemical industry has grown faster than demand over past 15 years, putting the chemical industry in a state of overcapacity.
- Demand for chemicals will continue to increase, driven by population growth and increase in standard of living in underdeveloped regions, albeit at a slightly lower rate than past 15 years.
- While growth rate is projected to be smaller over the next 15 years from 2025-2040 than it was in the past 15, volume growth of demand is forecast to be higher, due to larger base.
- Current trough in chemical industry is driving rationalization of higher-cost/less competitive assets. While the output from this capacity can be replaced by lower-cost production in today's market environment, this capacity will eventually need to be replaced to meet the world's growing demand.

24

Top-rated chemicals for investment in Alberta require 500+ new plants by 2040

Continued growth in population and standard of living requires new capacity to meet global demand

OPIS A DOW JONES COMPANY
CHEMICAL MARKET ANALYTICS



25

Top ranked chemicals were grouped into complexes for potential investment

Integration of base chemical and derivative value chains resulted in logical production configurations

OPIS A DOW JONES COMPANY
CHEMICAL MARKET ANALYTICS

- The top 15 chemicals included base chemicals and derivatives
- Chemicals are generally produced in integrated complexes, so the top-ranking chemicals were configured into logical production complexes, representing potential investment opportunities
- For chlorine and caustic (chlor-alkali), the addition of vinyls was recommended as potential investment as vinyls (PVC) provides an outlet for moving chlorine and ethylene. Canada is also a net importer of polyvinyl chloride (PVC) and its precursor vinyl chloride monomer (VCM), so an integrated complex could supply growing domestic need for vinyls in the building and construction market..

Top 15 chemicals	Complex
Ammonia	Ammonia and/or Ammonia-Urea
Butene-1	Ethane Cracker + PE + Butene-1 comonomer
Caustic Soda	Chlorine-Caustic (+ Vinyls with Ethylene supply)
Chlorine	Chlorine-Caustic (+ Vinyls with Ethylene supply)
Ethoxylates*	Ethoxylates + PEG with Purified Ethylene Oxide supply
Ethylene	Ethane Cracker + PE + Butene-1 comonomer
High Density Polyethylene	Ethane Cracker + PE + Butene-1 comonomer
Linear Low Density Polyethylene	Ethane Cracker + PE + Butene-1 comonomer
Low Density Polyethylene	Ethane Cracker + PE + Butene-1 comonomer
Methanol	Methanol
Polyethylene Glycol*	Ethoxylates + PEG with Purified Ethylene Oxide supply
Polypropylene	Propylene via PDH or Metathesis + Polypropylene
Propylene	Propylene via PDH or Metathesis + Polypropylene
Urea	Ammonia-Urea
Urea-formaldehyde resins (UF)	Urea-formaldehyde resins (UF)

26

Investment opportunities for chemical complexes were ranked

Each production complex was evaluated to identify potential investors

OPIS A DOW JONES COMPANY
CHEMICAL MARKET ANALYTICS

- The scores (with and without CCUS) were averaged to rank the complexes from most to least attractive. Note that all are considered investment opportunities based on market conditions and Alberta advantages; the ranking is for prioritization of potential.

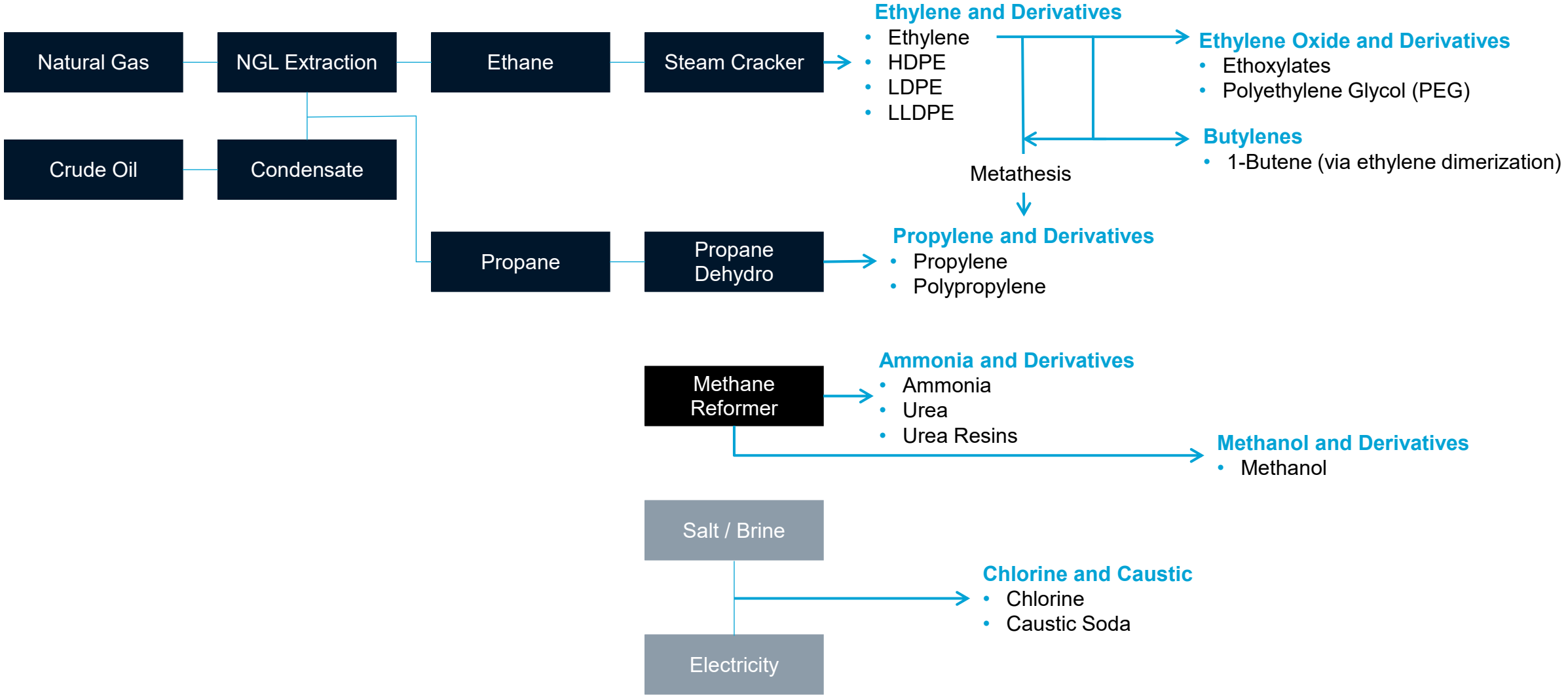
Rank	Complex	Avg. Score
1	Ammonia	7.11
2	Propylene via PDH or Metathesis + Polypropylene	6.89
3	Urea-formaldehyde resins (UF)	6.83
4	Ammonia-Urea	6.72
5	Methanol	6.72
6	Ethane Cracker + PE + Butene-1 comonomer	6.42
7	Ethoxylates + PEG with Purified Ethylene Oxide supply	6.38
8	Chlorine-Caustic (+ Vinyls with Ethylene supply)	6.27

- For each complex, current projects underway or under evaluation in Alberta, and potential investors in new projects were identified

27

Shortlisted Products – Value Chain Perspective

15 Top Products aligned to 8 production complexes



Conclusions

OPIS A DOW JONES COMPANY
CHEMICAL MARKET ANALYTICS

- Chemical demand will continue to increase, as population grows and more of the world is lifted out of poverty
- Advancement to circular plastics continues, at a slow pace, with fossil-based plastics required through 2050 and beyond, even in a fully circular scenario
- Electric vehicles will impact demand for fuel but use of chemicals in automotive industry will continue as plastic demand is higher in EVs, driven by need for lightweight, durable and insulating materials
- Continued demand for chemical feedstocks coupled with reduced demand for transportation fuel will require refineries to adjust production to maximize naphtha yields
- Decarbonization continues as a long-term global trend, with pull back in USA under Trump impacting projects and investments in the near term and costs leading to rationalization in Europe in a competitive market
- New chemical capacity will be required post-trough. Broad-based strategies for investment should focus not only on cost-competitive feedstock position but also on carbon intensity and policy durability
- Canada and Alberta's Industrial Heartland remains an attractive region for petrochemical investment due to feedstock advantage and decarbonization infrastructure

OPIS A DOW JONES COMPANY

CHEMICAL MARKET ANALYTICS

Customer Service
support@chemicalmarketanalytics.com
North America: +1 888.301.2645 (toll-free within the U.S.)
https://www.opisnet.com/contact/contact-us/